

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Claims 1-116 (Cancelled)

117. (New) A microfluidic chip having a length, width and height, wherein said height is the smallest dimension, said microfluidic chip comprising:

a) a cell chamber having at least one nonplanar element for establishing and/or maintaining electrical communication with a cell, wherein said nonplanar element has a surface defining an opening for separating a cell from an electrode compartment and is an integral part of the microfluidic chip, and wherein the surface defining the opening comprises portions of a wall of said cell chamber;

b) a first channel lateral to and in communication with said cell chamber, and oriented so as to provide a fluid flow with respect to the non-planar element so as to exert a positive fluidic pressure on a cell attached to the surface defining the opening of the non-planar element; and

c) a second channel lateral to said cell chamber and in communication with the surface defining the opening on the wall of the cell chamber so as to produce a negative pressure on a cell drawing it into contact with the surface defining the opening,

wherein said cell chamber, said first channel and said second channel each comprise two walls and a base wherein the walls are parallel to the height of said microfluidic chip and the base is perpendicular to the height of said microfluidic chip, and whereby a high electrical resistance seal is established and/or maintained between a cell and the surface defining the opening by the combination of the positive pressure of the fluid flow from the first channel and the negative pressure from the second channel.

118. (New) The microfluidic chip of claim 117, wherein the at least one nonplanar element comprises a raised portion having an opening in which a conducting fluid is disposed.

119. (New) The microfluidic chip of claim 118, wherein the conducting fluid is in electrical communication with a conducting element.
120. (New) The microfluidic chip of claim 117, wherein at least a portion of the nonplanar element comprises a conducting surface.
121. (New) The microfluidic chip of claim 117, wherein the nonplanar element comprises a nonconducting surface.
122. (New) The microfluidic chip of claim 117, wherein at least a portion of the substrate comprises a polymer.
123. (New) The microfluidic chip of claim 122, wherein the polymer comprises an elastomeric polymer.
124. (New) The microfluidic chip of claim 117, wherein at least a portion of the nonplanar element comprises a carbon material.
125. (New) The microfluidic chip of claim 117, wherein the surface is protruding or rounded.
126. (New) The microfluidic chip of claim 117 or 118, further comprising a voltage source for creating an electrically resistant seal between a surface of the nonplanar element defining the opening and a cell in proximity to the opening.
127. (New) The microfluidic chip of claim 126, wherein the resistance of the seal is at least about 100 Mohm.
128. (New) The microfluidic chip of claim 117, wherein the nonplanar element is pyramidal, conical, elliptical, toroidal, or comprises stacked planar elements.
129. (New) The microfluidic chip of claim 117, wherein the cell chamber comprises a plurality of the nonplanar elements.
130. (New) The microfluidic chip of claim 117, wherein at least a portion of a surface of the nonplanar element is hydrophilic.
131. (New) The microfluidic chip of claim 117, further comprising a fluid controlling mechanism to control hydrostatic pressure of at least one channel.
132. (New) The microfluidic chip of claim 117, wherein a surface of the nonplanar element is modified by exposure to chemical washing.

133. (New) The microfluidic chip of claim 117, wherein a surface of the non-planar element is modified by gas phase chemical deposition.
134. (New) The microfluidic chip of claim 125, wherein the protruding surface is one or more of a column, rod, or reeve.